

## Claims

1. A tone control apparatus which constitutes a tone control filter having a desired characteristic by inputting a  
5 filter factor into said tone control filter, and which adjusts a sound signal by making the sound signal pass through said tone control filter, characterized in that said tone control apparatus comprises:

10 a smoothing means for smoothing a Fourier spectrum of a desired filter response;

a cepstrum calculating means for calculating a cepstrum from the Fourier spectrum smoothed by said smoothing means; and

15 a filter factor calculating means for calculating said filter factor based on the cepstrum calculated by said cepstrum calculating means.

20 2. The tone control apparatus according to Claim 1, characterized in that the filter factor inputted to the tone control filter is a fixed filter factor calculated in advance.

3. The tone control apparatus according to Claim 1, characterized in that said apparatus includes a means for allowing a change of the desired filter response and for updating said filter factor successively according to said  
25 change of the desired filter response while the sound signal is inputted into the tone control filter.

4. The tone control apparatus according to Claim 1, characterized in that said apparatus includes a means for  
30 determining the desired filter response based on a result of

analysis of the sound signal while the sound signal is inputted into the tone control filter.

5        5. The tone control apparatus according to Claim 1, characterized in that said apparatus includes a means for smoothing the Fourier spectrum by filtering a series of sampled values of the Fourier spectrum with a low pass filter.

10       6. The tone control apparatus according to Claim 1, characterized in that said apparatus includes a means for smoothing the Fourier spectrum by replacing each odd or even-numbered sampled value of the Fourier spectrum with an average of sampled values adjacent to each odd or even-numbered sampled value.

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      7. The tone control apparatus according to Claim 1, characterized in that said apparatus includes a means for detecting a change point of the Fourier spectrum of the desired filter response, which changes steeply, and for smoothing a  
20       certain range of the Fourier spectrum with its center being at the change point.

      8. The tone control apparatus according to Claim 1, characterized in that the tone control filter is a log magnitude  
25       approximation filter, and the cepstrum is set as the filter factor of the tone control filter.

      9. The tone control apparatus according to Claim 1, characterized in that the tone control filter is an IIR filter,  
30       and a linear prediction coefficient to which the cepstrum is

converted is set as the filter factor of the tone control filter.